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### REMARKS

Claim 27 has been canceled. Claims 6, 24, and 30 have been amended. Claims 1-6, 8-12, 14, 16, 18-22, 24-26, and 28-36 are now pending in this application and are presented for examination. Reconsideration of the present application in light of the above amendments and the following remarks and an indication of allowance of the pending claims are respectfully requested.

Claims 1, 5-6, 9-12, 14, 16, 18, 20-21, and 34-35 were rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 4,720,896 to Polinski et al. (Polinski) in view of U.S. Patent No. 5,202,303 to Retallick et al. (Retallick), U.S. Patent No. 6,040,266 to Fay, III et al. (Fay), U.S. Patent No. 5,183,401 to Dalla Betta et al. (Dalla Betta), and U.S. Patent No. 5,110,561 to Hitachi et al. (Hitachi). Claims 24-26, 29, and 31 were rejected under 35 U.S.C. 103(a) as being unpatentable over Polinski in view of Retallick, Fay, Dalla Betta, Hitachi, and Butler et al. (RMRS-RP-9). Claims 2, 8, and 22 were rejected under 35 U.S.C. 103(a) as being unpatentable over Polinski in view of Retallick, Fay, Dalla Betta, and Hitachi, and further in view of U.S. Patent No. 5,207,053 to Spadaccini et al. (Spadaccini). Claims 3 and 19 were rejected under 35 U.S.C. 103(a) as being unpatentable over Polinski in view of Retallick, Fay, Dalla Betta, Hitachi, and Butler, and further in view of U.S. Patent No. 5,228,847 to Lywood et al. (Lywood). Claims 27 and 30 were rejected under 35 U.S.C. 103(a) as being unpatentable over Polinski in view of Retallick, Fay, Dalla Betta, Hitachi, Butler, and Lywood. Claim 4 was rejected under 35 U.S.C. 103(a) as being unpatentable over Polinski in view of Retallick, Fay, Dalla Betta, and Hitachi, and further in view of U.S. Patent No. 5,645,803 to Steenackers et al. (Steenackers). Claim 28 was rejected under 35 U.S.C. 103(a) as being unpatentable over Polinski in view of Retallick, Fay, Dalla Betta, Hitachi, and Butler, and further in view of Steenackers. Claims 32-33 were rejected under 35 U.S.C. 103(a) over Polinski in view of Retallick, Fay, Dalla Betta, Hitachi, and Butler. Applicants respectfully request allowance of the present application in view of the foregoing amendment following remarks.

#### Claim 1

Independent Claim 1 was rejected on the five-way combination of Polinski in view of Retallick, Fay, Dalla Betta and Hitachi as set forth above. As stated in *In re Kahn*, 441 F.3d 977, 988 (CA Fed. 2006, cited with approval in *KSR Int'l v. Teleflex*

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*Inc.*, 127 S.Ct. 1727, 1741 (2007), "rejections on obviousness grounds cannot be sustained by mere conclusory statements; instead there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness." (Emphasis added). Specifically, "it can be important to identify a reason that would have prompted a person of ordinary skill in the relevant field to combine the elements in the way the new claimed invention does." *Id.* While doing so, "[a] factfinder should be aware, of course, of the distortion caused by hindsight bias and must be cautious of arguments reliant upon ex post reasoning." *Id.* Applicants submit that the Examiner's rejection of Claim 1 over the combination of five references is based upon hindsight reasoning and lacks a rational reasoning for making the combination.

Claim 1 requires:

a first catalytic stage comprising a metallic catalyst support and receiving an oxidizer and a fuel and discharging a partially oxidized fuel/oxidizer mixture;  
a second catalytic stage comprising a ceramic reticulated foam catalyst support disposed within a pressure boundary defining a pressure boundary cross-sectional flow area...

The Examiner admits on page 4 of the February 13, 2008 Office Action that Polinski does not teach a metallic catalyst support for the first catalytic stage and a ceramic reticulated foam catalyst support for the second catalytic stage. However, the Examiner contends that Retallick teaches a metallic catalyst support for a first catalytic stage at col. 2, line 58 through col. 3, line 3 of Retallick. The Examiner concludes it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the teachings of Polinski with the teachings of Retallick since ceramic supports are likely to shatter due to thermal shock.

Applicants respectfully disagree with the Examiner's position. Polinski is directed to a catalyst system divided into upstream and downstream portions. For purposes of this argument only, the upstream portion will be considered to be a first catalytic stage as claimed. Polinski discloses at numerous places in its specification that the upstream portion (first catalytic stage) is protected against "thermal conductivity and radiant heat transfer from the downstream portion." As a result, the upstream portion (first catalytic stage) of Polinski is protected from "excessively high temperatures" and is allowed "to operate at relatively lower temperature."

See e.g. col. 4, lines 51-53 of Polinski (emphasis added):

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In this way, not only is the upstream portion of the catalyst protected against excessive temperatures but unique advantages are realized...

See e.g. col. 5, lines 27-32 of Polinski (emphasis added):

As shown in FIGS. 3A, 3B, 3C, and 3D, various kinds of constricted passages may be used between the protected upstream portion 20 and the downstream portion of the catalyst system to reduce radiant heat transfer as well as thermal conduction from the downstream portion to the upstream portion.

See e.g. col. 5, lines 57-61 of Polinski (emphasis added):

As a result, heat transfer from the downstream portion is effectively reduced allowing the upstream portion of the catalyst system to operate at relatively lower temperature.

See e.g. col. 6, lines 50-53 of Polinski (emphasis added):

Additionally, the temperature of the protected upstream portion 20 is preferably further reduced by using an enclosed wall 52 having low reflectivity and low thermal conductivity properties.

Accordingly, susceptibility to high temperature and shattering due to thermal shock is not an issue in the upstream portion (first catalytic stage) of Polinski because the temperatures of the upstream portion (first catalytic stage) are maintained at relatively low temperatures. As such, one of ordinary skill in the art would not have reasonably been led to modify the upstream portion (first catalytic stage) of Polinski to include the metallic catalyst support of Retallick to eliminate the possibility of shattering due to thermal shock. Only in hindsight view, based upon Applicants' teachings, would one make the Examiner's proposed substitution. For the above reasons, independent Claim 1 is in condition for allowance.

Further, Claim 1 requires "an oxidation completion stage disposed downstream of the second catalytic stage for recombining the first and second portions of the mixture and completing oxidation of the mixture..." On page 4 of the February 13, 2008 Office Action, the Examiner also admits that Polinski does not teach "an oxidation completion stage disposed downstream of the second catalytic stage for recombining the first and second portions of the mixture and completing oxidation of the mixture." However, at page 5 of the February 13, 2008 Office Action, the Examiner contends at col. 13, lines 21-26 of Dalla Betta, Dalla Betta teaches "that a homogenous combustion zone does not need to be large since the

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gas residence time in the zone normally should not be more than about eleven or twelve milliseconds to achieve substantially complete combustion."

Applicants submit that even if the disclosure of Polinski was modified with the disclosure of Dalla Betta as the Examiner proposes, one would still not arrive at the claimed invention. As cited by the Examiner, Dalla Betta discloses that the residence time in its zone should be within a particular range to achieve substantially complete combustion. Accordingly, the combination of Polinski with Dalla Betta would lead one skilled in the art to ensure that the residence time in the first and second catalytic stages was sufficient. Nothing in Dalla Betta and Polinski remotely teaches or suggests adding an oxidation completion stage to the catalytic system of Polinski for recombining first and second portions of the mixture as Dalla Betta teaches one to modify the residence time within the particular zone, not add a stage, such as an oxidation completion stage for recombining first and second portions. Applicants remind the Examiner that Claim 1 is an apparatus rather than a method claim, and the references, including Dalla Betta, must teach or suggest the claimed structure to render Claim 1 unpatentable. The combination of cited references, including Dalla Betta, fail to do so. For this reason further, Claim 1 is in condition for allowance.

Dependent claims 2-4, 32, and 34 are dependent on Claim 1 and thus include the limitations of independent Claim 1. For the reasons set forth with respect to independent Claim 1, dependent claims 2-4, 32, and 34 are in condition for allowance.

#### Independent Claim 6

Independent Claim 6 was rejected over the five-way combination of Polinski in view of Retallick, Fay, Dalla Betta and Hitachi as set forth above. Amended independent claim 6 now requires a catalytic combustor comprising...

a second catalytic stage receiving the partially oxidized fuel/oxidizer mixture and further oxidizing the partially oxidized fuel/oxidizer mixture, the second catalytic stage comprising...a plurality of separate catalytic elements disposed along a flow axis of the combustor, each of the plurality of separate catalytic elements comprising an identical cross-section and being misaligned and angularly axially rotated about the flow axis with respect to an adjacent catalytic element effective to cause mixing of a flow about the flow axis...

Applicants submit that Claim 6 is in condition for allowance because the combination of cited references, including Retallick, do not teach or suggest "a

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plurality of separate catalytic elements, each of the plurality of separate catalytic elements comprising an identical cross-section and being misaligned and angularly axially rotated about the flow axis with respect to an adjacent catalytic element effective to cause mixing of a flow about the flow axis..." as required in amended Claim 6. As set forth at col. 5, lines 25-28 and as shown in FIG. 4 of Retallick, "[t]wo strips similar to that shown in FIG. 1 can be laid one on the other and then wound into a spiral to make the circular catalytic igniter of FIG. 4. As shown, in FIG. 4, the strips or adjacent catalytic elements are stacked on one another in alignment to define channels therebetween, i.e. channels 62, 63 of FIG. 6 and channels 9, 11 of FIG. 2. Accordingly, Retallick does not teach or suggest a plurality of separate catalytic elements, each of the plurality of separate catalytic elements comprising an identical cross-section and being misaligned and angularly axially rotated about the flow axis with respect to an adjacent catalytic element effective to cause mixing of a flow about the flow axis..." Polinski, Fay, Dalla Betta and Hitachi are further wholly silent as to a "a plurality of separate catalytic elements, each of the plurality of separate catalytic elements comprising an identical cross-section and being misaligned and angularly axially rotated about the flow axis with respect to an adjacent catalytic element effective to cause mixing of a flow about the flow axis..." In view of the above, Claim 6 is in condition for allowance.

In addition, even if Retallick disclosed the aforementioned limitations, which it does not, the Examiner has not provided any reason that would have prompted a person of ordinary skill in the relevant field to combine the teachings of Retallick with the teachings of Polinski as the Examiner has done to arrive at the claimed invention. While the Examiner contends on page 7 of the February 13, 2008 Office Action that Retallick discloses "a plurality of separate catalytic elements, each of the plurality of separate catalytic elements comprising an identical cross-section and being angularly axially rotated about the flow axis with respect to an adjacent catalytic element effective to cause mixing of a flow about the flow axis....," the only reasoning the Examiner provided for combining the teachings of Polinski and Retallick was that "ceramic supports are likely to shatter due to thermal shock." No rational reason was even provided or exists, however, that would have prompted one to modify the second catalytic stage of Polinski with the disclosure of Retallick to include a plurality of separate catalytic elements, each of the plurality of separate

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catalytic elements...being misaligned and angularly axially rotated about the flow axis with respect to an adjacent catalytic element ..." as claimed. Accordingly, for this reason further, independent Claim 6 is in condition for allowance.

Dependent claims 8-12, 14, 16, 18-22, and 34 are dependent on Claim 6, and therefore include the limitations of Claim 6. Accordingly, dependent claims 8-12, 14, 16, 18-22 and 34 are also in condition for allowance.

Independent Claim 24

Independent Claim 24 was rejected under 35 U.S.C. as being unpatentable over the six-way combination of Polinski in view of Retallick, Fay, Dalla Betta, Hitachi and Butler. Dependent claims 27 and 30 were rejected over the seven-way combination of Polinski in view of Retallick, Fay, Dalla Betta, Hitachi, Butler, and Lywood. As amended, independent Claim 24 requires that "the bypass passageway is disposed around a portion of an outer perimeter of the reticulated foam support."

As amended, Claim 24 is in condition for allowance as the Examiner's combination of seven references are so conflicting that they are necessarily based on hindsight reasoning and lack a rational reason to make the combination. With respect to Claim 24, the Examiner contends:

Hitachi et al teaches a honeycomb core body with a hollow space (see column 2, line 52 through column 3, line 24 and figure 1-3)

It would have been obvious to one of ordinary skill in the art at the time of the invention was made to modify the teachings of Polinski with the teachings of Hitachi et al such that the second catalytic stage would consist [of] the annular ring of honeycomb material (22b) throughout creating a bypass passageway for protection from being heated to abnormally high temperatures around the center (see Hitachi et al).

With respect to the limitations of original claim 30 (now incorporated into Claim 24) the Examiner argues on page 19 of the February 13, 2008 Office Action that the combination of Polinski in view of Retallick, Fay, Dalla Betta, Hitachi and Butler as applied to claim 24 should further be modified to incorporate the teachings of Lywood. In particular, the Examiner contends on page 21 of the February 13, 2008 Office Action that Lywood discloses the passageway is disposed around a portion of a perimeter of the reticulated foam support and that "[i]t would have been obvious to one of ordinary skill in the art at the time the invention was made to

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modify the combined teachings of Polinski, Fay, and Hitachi, with the teachings of Lywood to eliminate the need for high activity catalysts."

It is readily apparent that one skilled in the art would not have been prompted to modify the combined teachings of Polinski, Fay, and Hitachi, with the teachings of Lywood to eliminate the need for high activity catalysts as the Examiner has done. If one skilled in the art were to modify the teachings of Polinski to include an annular ring of honeycomb material creating a central bypass passageway useful for protection from being heated to abnormally high temperatures around the center as taught by Hitachi, there is no logical reason why one would then modify this combination such that the bypass passageway is disposed around a portion of an outer perimeter of the reticulated foam support to eliminate the need for high activity catalysts. In fact, the two proposed modifications completely contradict one another. Accordingly, there is no logical reason that would have a reason that would have prompted a person of ordinary skill in the relevant field to combine the elements as the elements has done to arrive at the claimed invention of Claim 24. For this reason alone, Claim 24 is in condition for allowance as one skilled in the art would not have been prompted to modify the teachings of Polinski, Fay, and Hitachi with the teachings of Lywood to arrive at the claimed invention.

Further, Applicants submit that the Examiner's reasoning for combining the teachings of Lywood with the teachings of Polinski, Retallick, Fay, Dalla Betta, Hitachi, and Butler to eliminate the need for high activity catalysts is irrational. As noted above, the Examiner contends at page 21 of the February 13, 2008 Office Action that "[i]t would have been obvious one having ordinary skill in the art at the time the invention was made to modify the combined teachings of Polinski et al., Fay, III et al. and Hitachi et al., with the teachings of Lywood to eliminate the need for high activity catalysts." The Examiner, however, provides no logical reasoning as to why one skilled in the art would even desire to eliminate high activity catalysts from the reticular foam catalysts of Polinski. In addition, there is no rational reason why one skilled in the art would desire to eliminate high activity catalysts. In addition, the Examiner has simply stated the problem in terms of its solution, which is indicative of hindsight reasoning. See *Ecolochem, Inc. v. S. Cal. Edison Co.*, 227 F.3d 1361, 1372 (Fed. Cir. 2000) ("...[d]efining the problem in terms of its solution reveals improper hindsight in the selection of the prior art relevant to obviousness."

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(quoting *Monarch Knitting Mach. Corp. v. Sulzer Morat GmbH*, 139 F.3d 877, 881 (Fed. Cir. 1998)). In view of the above reasons, Applicants further submit Claim 24 is in condition for allowance.

Dependent claims 25, 26, 28-31, and 36 are dependent on Claim 24 and thus include the limitations of independent Claim 24. For the reasons set forth with respect to independent Claim 24, dependent claims 25, 26, 28-31, and 36 are in condition for allowance.

Dependent Claim 30

Dependent Claim 30 provides further reasons for allowance. First, Applicants submit there is no logical reason to combine the teachings of Lywood with the teachings of Polinski, Fay, and Hitachi as discussed above. Further, Lywood does not teach or suggest that "the reticulated foam support comprises a cross-section perimeter smaller than an internal perimeter of the pressure boundary, the foam support supported against the internal perimeter by spaced apart standoffs comprising the reticulated foam support" as required in amended Claim 30. Instead, Lywood at col. 9, lines 48-51 discloses that "bypass passages are formed by an external conduit formed by the annular space between a liner 39 and the exterior shell of the combustion apparatus." There is no disclosure that the liner is a standoff comprising reticulated foam support. Accordingly, dependent claim 30 provides further reasons for allowance.

Conclusion

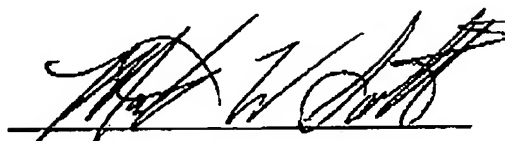
Accordingly, Applicant submits that all claims are in condition for allowance and request that a Notice of Allowance be issued. The commissioner is hereby authorized to charge any appropriate fees due in connection with this paper, including the fees specified in 37 C.F.R. §§ 1.16 (c), 1.17(a)(1) and 1.20(d), or credit any overpayments to Deposit Account No. 19-2179.



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Respectfully submitted,

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